

Project ESPRESSO: Airborne Space Environment Chamber Status, Interfaces, and Payload Capacities. A. H. Parker¹, K. Walsh¹, D. Durda¹, M. Cintala², and the Project ESPRESSO ASEC team. ¹Southwest Research Institute, ²NASA JSC. (aparker@boulder.swri.edu).

Introduction: The Airborne Space Environment Chamber (ASEC) is a large-volume, general-purpose vacuum chamber under development by the Southwest Research Institute and the Project ESPRESSO SServi node, which will be mounted aboard an NRC-CNRC Falcon 20 microgravity research aircraft to provide access to a space-like pressure and gravity environment for large and complex payloads. It is designed to host payloads that explore regolith-machine interactions, and will be capable of flying with large volumes of regolith simulant. In this presentation, we will provide a status update on the design and fabrication of the ASEC, its capacities, and the initial payload interfaces. These specifications will be made available to the community for designing experiments to fly in the ASEC.

ASEC Dimensions and Design: The ASEC design is a cylindrical pressure vessel that splits into three segments and two end caps, allowing it to be installed in the Falcon 20 aircraft in a modular fashion. Each segment is 36 inches in diameter and 28 inches in length, and will have three large (6 inch ID) instrumentation and viewing ports and one small (2 inch ID) cable pass-through ports. The segments are aluminum for weight saving. The entire chamber volume is approximately 1300 liters. A rack-mount system will be available inside the chamber, enabling experiment loading with standardized interfaces. The current baseline is illustrated in Figure 1; the finalized design of the chamber, its interfaces, and its dimensions will be presented at NESF.

Flight Campaigns: Project ESPRESSO will directly support a series of flight campaigns through 2022, hosting a series of regolith gardening, thermal inertia, and terramechanics experiments. Flight campaigns will be conducted at both lunar and asteroidal gravity levels. Additional flight campaigns will be arranged as needed to enable additional experiments by the community. Facility use queries may be sent via the Project ESPRESSO contact form:

<https://www.espresso.institute/contact/>

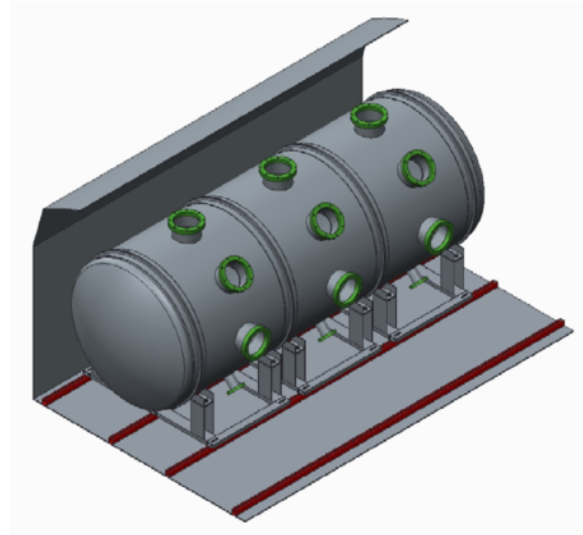


Figure 1: CAD rendering of the baseline ASEC design, shown inside a cutaway of the Falcon 20 cabin.